What is claimed is:

1. A method of reducing vulcanized rubber, the method comprising the steps of:

heating the rubber, wherein the rubber includes synthetic rubber, in the presence of a solvent, wherein the solvent includes water to a temperature below a critical temperature of the solvent;

providing a pressure that is at least equal to a saturated vapour pressure of the solvent at the temperature; and

maintaining the temperature and the pressure for a time sufficient to devulcanize the rubber and produce a reaction product that is primarily a solid phase and includes rubber hydrocarbon.

2. The method according to claim 1 wherein the solvent is water.

3. The method according to claim 1 wherein the solvent is a mixture of water and an organic solvent and the mixture provides reduction properties similar to that of water.

4. The method according to claim 3 wherein the organic solvent includes alcohol.

5. The method according to claim 4 wherein the organic solvent is alcohol.

6. The method according to claim 2 wherein the temperature is between about 260°C and about 350°C.

7. The method according to claim 6 wherein the temperature is between about 290°C and about 320°C.

8. The method according claim 1 wherein the pressure is at least partially provided for by pressurization with an inert gas.

9. The method according to claim 1 wherein the rubber is a tire.

10. The method according to claim 9 wherein the tire is a whole used tire.

11. The method according to claim 9 wherein the tire is shredded to produce pieces of tire.

12. The method according to claim 11 wherein the pieces of tire have a particle size between about 0.5 mm and about 5 mm.

13. Surface devulcanized rubber produced according to the method of claim 1.

14. Completely devulcanized rubber produced according to the method of claim 1.

15. A method of reducing a vulcanized tire, the method comprising the steps of:

heating the tire, wherein the tire includes synthetic rubber, in the presence of a first solvent, wherein the first solvent includes water, to a temperature below a critical temperature of the first solvent;

providing a pressure that is at least equal to a saturated vapour pressure of the solvent at the temperature;

maintaining the temperature and the pressure for a time sufficient to devulcanize the tire and produce a reaction product that is primarily a solid phase and includes rubber hydrocarbon;

washing and drying the solid phase of the reaction product;

dissolving the rubber hydrocarbon in a second solvent, the second solvent being appropriate for the dissolution of rubber hydrocarbon therein;

separating the carbon black from the reaction product; and

separating the second solvent from the rubber hydrocarbon.

16. Rubber hydrocarbon produced according to the method of claim 15.

17. Rubber hydrocarbon that has been devulcanized and at least partially depolymerized according to the method of claim 16, wherein a molecular weight of the rubber hydrocarbon is larger than a molecular weight of oil.

18. Rubber hydrocarbon produced by the process of claim 15 wherein the rubber hydrocarbon is in a mixture that includes carbon black.

19. Rubber hydrocarbon produced by the process of claim 15 wherein the rubber hydrocarbon is substantially free of sulphur.

20. Carbon black produced by the process of claim 15.

21. Carbon black according to claim 20 wherein the carbon black has a surface area

of 60 m^2/g.

22. Carbon black according to claim 20 wherein the carbon black approaches that used to manufacture tires.

23. A method of reducing a vulcanized tire, the method comprising the steps of:

heating the tire, wherein the tire includes synthetic rubber, in the presence of water to a temperature between about 290°C and about 350°C;

providing a pressure that is at least equal to a saturated vapour pressure of water at the temperature; and

maintaining the temperature and the pressure for a time sufficient to devulcanize the tire and produce a reaction product that is primarily a solid phase and includes rubber hydrocarbon.